

EVOLVED EXPENDABLE LAUNCH VEHICLE (EELV)

DEVELOPMENT AND INITIAL LAUNCH SERVICES

REQUEST FOR PROPOSAL

ANNEX 16

MISSION UNIQUE REQUIREMENTS

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1.0 INTRODUCTION

The purpose of the EELV system is to launch the NMM payloads. To launch a specific payload, all interface requirements must be met, which for some payloads may extend beyond those encompassed by the system requirements and standard interface requirements. This document contains a description of mission unique requirements for payloads to be launched during the ILS period. Also included is a list of reference documents, which will be available in the EELV library to help completely scope each launch effort.

2.0 SCOPE

The requirements defined herein represent the Government's assessment of the most significant mission unique requirements for each mission in the NMM. These requirements do not represent the complete set of mission unique requirements necessary to launch each payload. The LV provider shall use this Annex, along with the system requirements, the standard interface requirements, the reference documents in the EELV library (ICDs, IRDs, and payload questionnaires), and the information gained directly from the SV providers, to completely define the scope of work necessary to launch each mission. The payload questionnaires contain additional information in several areas, which were not covered extensively in the SIS, such as SV GSE to be located at the launch site. Mission unique requirements for the classified missions will be provided separately in a Classified Mission Unique Annex.

3.0 EELV LIBRARY REFERENCE DOCUMENTS

The below listed reference documents provide the LV contractors additional information on payload requirements. If there is any discrepancy between the information provided in the reference documents and the mission unique requirements described in this document, the mission unique requirements shall be given precedence.

Document	Identifier	Date
DMSP/Titan II ICD	ICD-TII-25006	3/1/89
DMSP Payload Questionnaire		4/14/98
DMSP Launch Base Processing Handbook	DMSP-LBPH-203	10/95
DSCS III/Atlas II ICD	LMASS-MLS-ICD-101	5/31/95
DSCS Payload Questionnaire		4/14/98
GPSIIR/Delta II ICD	ICD-GPS-338 Rev B	12/96
GPSIIF/LV IRS	IRS-GPS-SV/LV-07	10/16/97
GPSIIF Payload Questionnaire		4/14/98
DSP/IUS/Titan IV ICD	ICD-B-81330 Rev D	1/31/97
	ICD-B-81330,Appendix A	1/31/97
DSP Payload Questionnaire		4/14/98
SBIRS High Payload Questionnaire		5/28/98
SBIRS Low Payload Questionnaire		4/14/98

4.0 PAYLOAD MISSION UNIQUE REQUIREMENTS

Specific mission unique requirements are given below.

4.1 DMSP Mission Unique Requirements

Type of Requirement	SIS Paragraph	Actual SV Requirement
PLF Access Doors	3.1.4.1	One door must be large enough for personnel to enter the fairing and access high areas of the SV; More than two access points - see Fig. 1 (Several changes to older version in the Payload Database Document)
Emergency Detanking	3.1.4.2, 4.5	A person must be able to enter the fairing wearing a SCAPE suit to access SV valves.
SV Radio Frequency Link	3.2.5.4	S-Band RF link from pad to payload facility (Bldg 1559)
SV Instrument Purge	3.3.1, 3.3.3	Chilled Grade B Gaseous Nitrogen needed for transmitter cooling (14°C max, 7.5±1 psig, up to 500 SCFH). This should be supplied through liftoff (i.e. to a 'fly-away' connection)
Acceleration Loads	3.6	Coupled loads cycle necessary to support S/C modifications scheduled to begin in CY99. This is in addition to the two standard loads cycles.
Acoustic Levels	3.8	Acoustic attenuation to satisfy SV limits; See Table 1.
Propellant Services	4.1	High pressure Nitrogen supply to bring tanks to flight pressure of 4500 psig after transport to launch site. Approximately 10 lbs. of N2 are required.

4.2 DSCS Mission Unique Requirements

Type of Requirement	SIS Paragraph	Actual SV Requirement
Payload Fairing Doors	3.1.4	Four doors vs. two standard. Refer to figures C-20, C-21 in DSCS III ICD
Electro Magnetic Compatibility/ Interference (EMC/EMI)	3.2.6.1.3 (Figure 12)	Section 3.3.7.3, and Figure 3-13 of DSCS III ICD. Requirement is 143.8 DBuV/m max at 2-2.5 GHZ and 25 DB unintentional within SV S-band transponder bandwidth.
Conditioned Air	3.3.2.1	Relative humidity 30-55%, inlet flow rate at 115-160 lbs/min, and impingement flow velocity less than 20 fps.
SADAPTA GN2 Purge	3.3.3	Refer to sections 3.5.7.1.1 (SADAPTA purge quality/quantity requirements), 3.5.7.2.1 Transport GN2 interface, and 3.5.7.2.3 (SADAPTA purge panel interface at Pad) of DSCS III ICD
Acceleration Load Factors	3.6	Two total loads cycles is sufficient, however require first coupled loads analysis as soon as possible during EMD to validate new IABS design.
On-Pad GSE	4.0	Support to SV test GSE at SV access levels. Unique SV RF interface. See payload questionnaire for details.
Orbital Parameter	n/a (SPD-3.2.1)	Argument of Perigee at first ascending node = 178.9

4.3 DSP Mission Unique Requirements

Type of Requirement	Applicable SIS Paragraph	DSP ICD Para. No./Actual SV Requirement
Payload Stiffness	3.1.7	3.2.1.1 Stiffness, 3.1.1.4 Envelope, Appendix A
Routine Access	3.1.4.1	3.5.7.2 Access After P/L Installation, see page C231. All doors must be accessed simultaneously.
Electromagnetic Compatibility	3.2.6	3.2.3.4 Electromagnetic Compatibility see attached paragraph 3.2.3.4
SV Radiation Narrowband, SV Radiation Broadband	3.2.6.1.1, 3.2.6.1.2	3.3.9.1.1 Unintentional Emissions 3.3.9.1.2 Intentional Emissions See Figures 3.3-3 and 3.3-4 and Table 3.3-3
LV Radiation Narrowband, LV Radiation Broadband	3.2.6.1.3, 3.2.6.1.4	3.3.9.2 IUS Radiated Emissions Unintentional - see Figures 3.3-6 and 3.3.7 Intentional - see Table 3.3-4 and Figure 3.3.8 3.3.9.3 Titan Radiated Emissions Unintentional - see Figures 3.3-6 and 3.3-7 Intentional - see para. 3.3.9.3.2, pages 79 and 80
SV Instrument Purge	3.3.3	3.5.8.1 High Purity GN ₂ (see EELV SIS paragraph 1.5)
SV Compartment Thermal Env.	3.4.1	3.2.4.7 PLF Radiation. See Figure 3.2-28
Free Molecular Heating	3.4.2	3.2.4.8 Free Molecular Heating. See Figure 3.2-29
Particulate Contamination, Molecular Contamination	3.5.4.1., 3.5.4.2	3.2.2.1.3.2 Upper Stage - Visibly clean level 2 per MUCCA MCR-96-8202, para. 3.3.2.5 Maximum Allowable SV Deposition Levels From LV. Note that the sensor requirement is no greater than 0.5 % obscuration, no greater than 75 angstroms molecular contamination.
Acceleration Load Factors	3.6	3.2.1.3 Design Verification Loads - A loads analysis will be required to determine the impact to DSP. Two total loads cycles is sufficient.
Vibration	3.7	3.3.6 Vibration, See page 71 of ICD-B-81330
Acoustics	3.8	3.3.5 Acoustic, See page 71 of ICD-B-81330
Shock	3.9	3.3.7 Shock, See page 71 of ICD-B-81330
Ground Processing Load Factors	3.10	See SY1-79, par 3.2.5.5.1 Handling limits are 2G vertical and 0.5G horizontal.
Payload Fairing Internal Pressure	3.11	3.3.8 Pressure. See page 71 of ICD-B-81330. Depressurization rate no greater than 0.5 psi/sec.
Access to Payloads Timeline	4.2	3.1.1.6 Access Provisions See page 100 of ICD-B-81330. See Appendix C, pages C231 and C248. Sensor/Radec require fairing access to remove covers, inspect for contamination, and remove platforms in this time frame.

4.4 SBIRS-GEO Mission Unique Requirements

Type of Requirement	Applicable SIS Paragraph	Actual SV Requirement
SV Instrument Purge (GN2)	3.3.3 (SIS V3.8)	PLF GN2 Purge for Payload Telescope & A2100 INUs See Table 2, below.

4.5 SBIRS-LEO Mission Unique Requirements

Type of Requirement	SIS Paragraph	Actual SV Requirement
EMI/EMC	3.2.6.1.1	Need ability to functionally test 60 GHz cross-link after LV/SV mate.
Fluid Interfaces & Services	3.3.2.1	Need guarantee of PLF air minimum humidity > 35%.
Contamination Control	3.5.4.1, 3.5.4.2	Cleanliness requirements: 0.1% obscuration, 100 angstroms particulate, Level 300 surface cleanliness

4.6 GPS Mission Unique Requirements

Type of Requirement	SIS Paragraph	Actual SV Requirement
Payload Fairing Doors	3.1.4	Need third payload fairing door for W-sensor sunshade soft cover removal. Access location is approximately 100" above the separation plane. Minimum size is 6" x 12". Access required at latest possible SV access time.
SV Radio Frequency Link	3.2.5.4	S-Band RF link from pad to Boeing payload processing facility
Acceleration Load Factors	3.6	Coupled loads analysis as soon as possible during EMD to support spacecraft design activity.

Table 1: DMSP Acoustic Levels.

1/3 Octave Band Center Frequency (Hz)	EELV - MLV SV Sound Pressure Level (dB re 20 micropascal)	DMSP ATP SV Sound Pressure Level (dB re 20 micropascal)
40	123.4	117.5
50	123.0	120.0
63	124.5	122.0
80	126.0	124.0
100	128.2	126.0
125	129.1	127.5
160	130.0	129.0
200	131.1	130.0
250	130.5	130.8
315	130.0	130.5
400	130.0	130.0
500	129.8	129.0
630	128.3	128.0
800	126.9	127.0
1000	123.9	125.0
1250	122.0	122.5
1600	120.4	119.5
2000	120.9	116.0
2500	117.9	113.0
3150	117.2	110.0
4000	115.5	106.0
5000	114.5	104.0
6300	113.7	101.0
8000	113.9	97.5
10000	114.8	95.0
OASPL	140.5	139.7

TABLE 2: SBIRS High GN2 Purge Requirement.

COMPONENT	FLOW	RATE	DURATION
	MIN	MAX	
Payload Telescope	100 FT ³ /HR	250 FT ³ /HR	<ul style="list-style-type: none"> Required during all moves and for a minimum of 24 hours, post-move
A2100 INUs	2 FT ³ /HR	2 FT ³ /HR	<ul style="list-style-type: none"> Until T-0

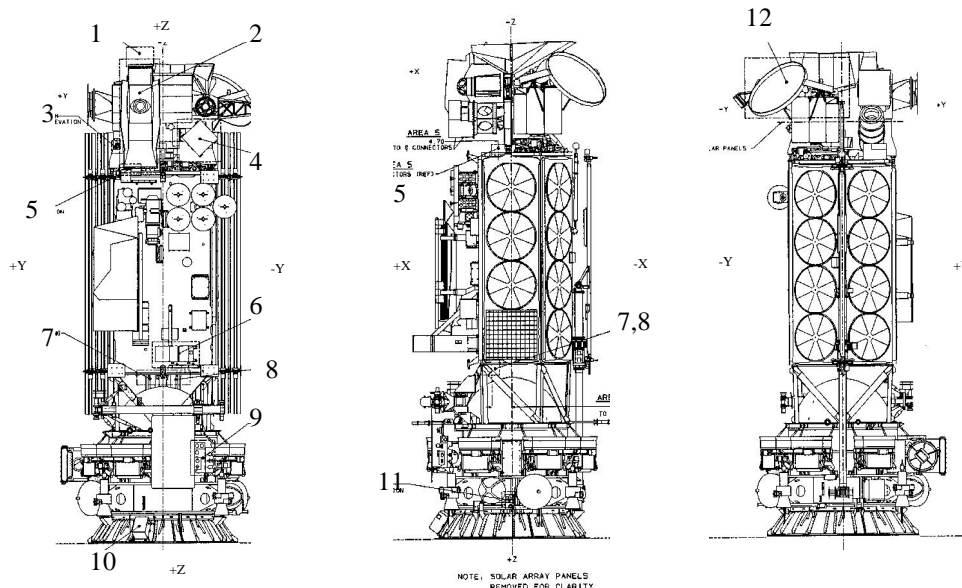


Figure 1 - DMSP Access Locations

Area # - access time*	Item	Elevation (inches from LV/SV interface)	Radial Position (degrees)
1 - After Mech Preps - FA	SSS Scanner Cage	185.71	241.91
2 - final access	SSS Purge Bag	166.65	241.91
3 - May vary**	Porro Prism	151.40	236.31
4 - Final Access	SSF Purge Bag	154.60	305.07
5 - Final Access	OLS Connector	142.89	209.69
6 - Final Access	SSULI	71.98	277.12
7 - Final Access	Single Point Arming	62.44	236.31
8 - Final Access	BJ Connectors	62.44	307.35
9 - ~ 24 hrs prior (GN2 Pressurization)	Fill & Drain Valves	32.65	301.76
10 - Final Access	GIU	7.35	252.75

* Most of the activities listed here fall within the final access time since they are arming or purge removals. Access for all non-flight covers will be required at final access, however, some activities aren't too time critical and could be done 24 hours prior (for example).

** - porro prism access will depend on how we do AGS. This requirement may go away if we use the booster for ascent navigation.

Notes for DMSP Figure 1

The enclosed drawing represents areas of the DMSP spacecraft where access is required before launch. This layout addresses only areas that need to be accessed and not how much space is required since there is no launch flow, PLF or encapsulation scheme currently in place. The actual door sizes will be dependent on physical limitations imposed by the PLF, MST, and launch flow.

The following are notes to the fairing access drawing areas for the DMSP 5D-3 satellite:

(1) SSS Scanner caging / uncaging - Need access to area above and behind where the SSS purge bag (2) is located. Would like to see the top of the SSS while performing the operation.

(2) SSS purge bag - Need to remove a bag like cover from the primary sensor. Also perform final mirror inspection.

(3) Porro Prism - Need line-of-sight from the theodolite building on the ground to the porro prism mirror for prelaunch azimuth position determination. The porro prism is unique in that a clear field of view is required from a known geodetic reference to that location. Usually an optical alignment facility, using geodetic reference piers, is established close to the pad deck.

Notes for DMSP Figure 1 (cont.)

- (4) SSF Purge bag - Need to remove cover from sensor and remove purge line.
- (5) OLS connectors - Need access to this area to mate and demate connectors. Need visual access to inspect connectors.
- (6) SSULI - Access to install / remove arming plugs and connect / disconnect vacuum ion pump connector.
- (7) Single Point Arming - Need access to mate and demate connectors located on the bottom of the spacecraft panel.
- (8) BJ connectors - Same as (7).
- (9) Fill and Drain Valves - Need access to pressurize the GN2 system. Also need access to valves by person wearing a SCAPE suit in the event of an emergency N2H4 off-load operation. BJ4 and SPJ4 electrical connections are also accessed at this location.
- (10) GIU - Access required to mate and demate a connector.
- (11) Omni antenna - Need a reradiating antenna pick-up or RF window at two fairing locations, -X centered and +X biasing the +Y side. Elevation 43°.